

Appl. No.: 09/859,482

November 24, 2004

Reply to Examiner's email of 11/19/04

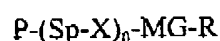
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This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

1. – 13. (Canceled)

14. (Currently Amended) Polymer layers comprising an anisotropic polymer layer exhibiting a tilted structure with an optical axis having a tilt angle  $\theta$  relative to the plane of the layer greater than zero, obtained by polymerizing a polymerizable mesogenic material comprising at least one compound of the formula:



1

wherein

P is a polymerizable group,

Sp is a spacer group having 1 to 20 C atoms,

X is a group of -O-, -S-, -CO-, -COO-, -OCO-, -OCOO- or a single bond,

n is 0 or 1,

MG is a mesogenic or mesogenicity supporting group,

and

R is an alkyl radical with up to 25 C atoms optionally unsubstituted, mono- or polysubstituted by halogen or CN, optionally one or more non-adjacent CH<sub>2</sub> groups are replaced, independently, by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S- or -C≡C- where oxygen atoms are not linked directly to one another, or R is halogen, cyano or, independently, P-(Sp-X)<sub>n</sub>- as defined in formula I;

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wherein the polymerizable mesogenic material comprises at least 95% by weight of polymerizable compounds, and

the tilt angle  $\theta$  in each of said layers varies continuously in a direction normal to the layer, starting from a minimum value  $\theta_{\min}$  of 0 – 20 degrees at the side of the layer facing the other layer or, if present, the common substrate, and ranging to a maximum value  $\theta_{\max}$  of 20 – 90 degrees on the opposite side of the layer.

15. (Canceled)

16. (Canceled)

17. (Canceled)

18. (Canceled)

19. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 14 36, wherein the polymerizable material comprises at least one compound of formula I having one polymerizable group and at least one compound of formula I having two polymerizable groups.

20. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 14 36, wherein the polymerizable material comprises at least one compound of formula I wherein the mesogenic group MG is of the ~~formulae~~ formula:

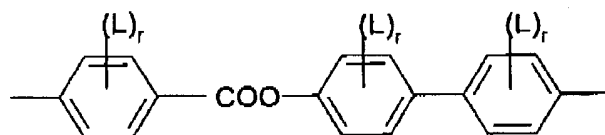
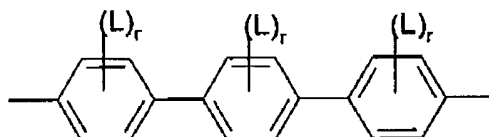
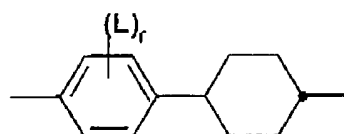
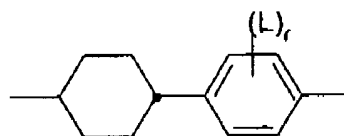
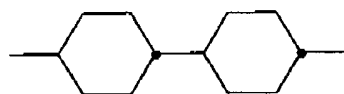
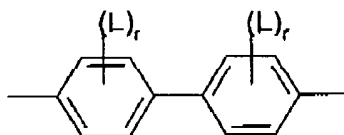
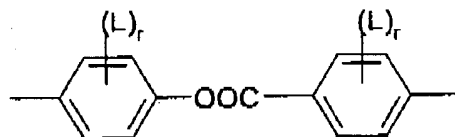
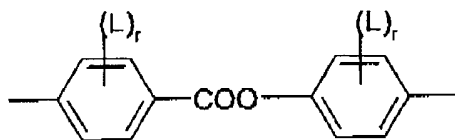
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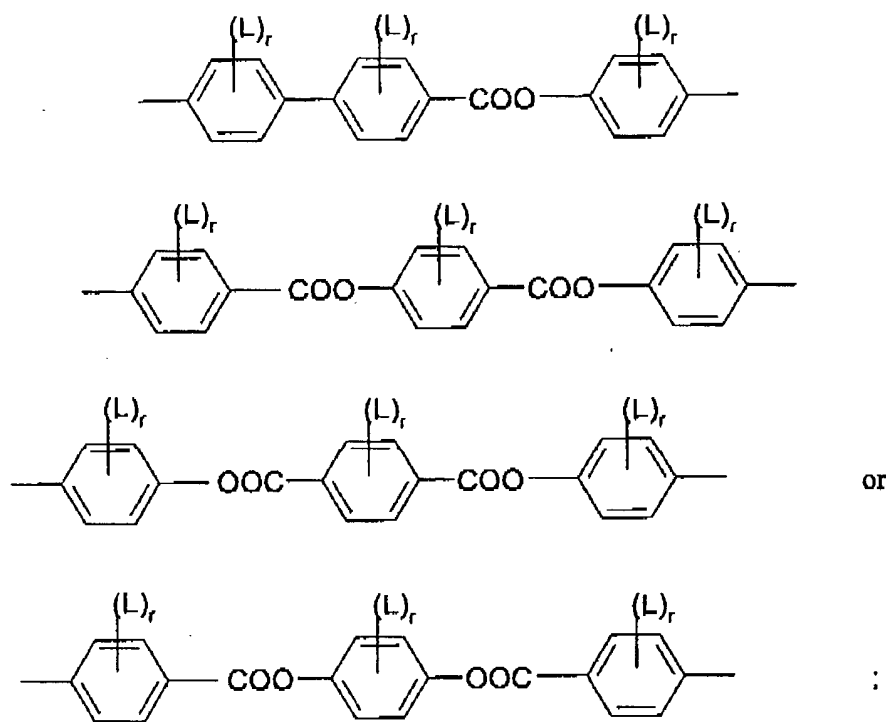
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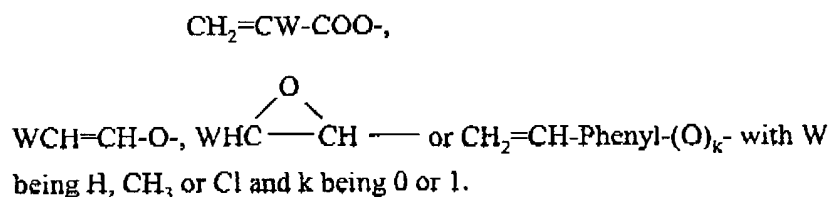


where L is: F, Cl, CN, or a fluorinated alkyl, alkoxy or alkanoyl group with 1 to 4 C atoms,

and

r is 0, 1 or 2.

21. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 14 36, wherein the polymerizable material comprises at least one compound of formula I where P is:



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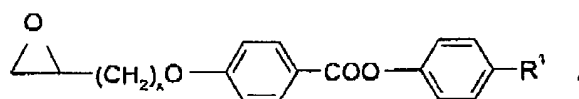
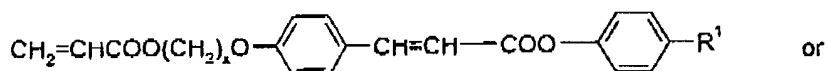
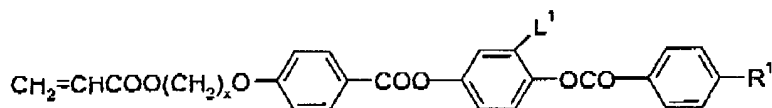
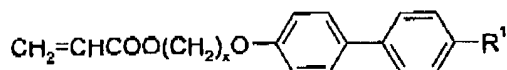
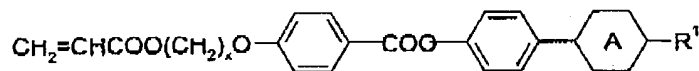
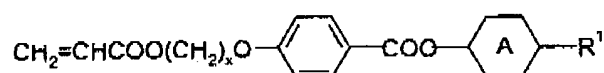
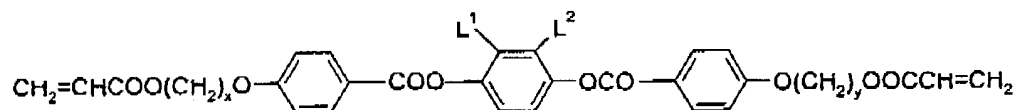
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22. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 14 ~~36~~, wherein the polymerizable mesogenic material comprises at least one compound of the formulae formula:



wherein x and y are, independently, 1 to 12, A is a 1,4-phenylene or 1,4-cyclohexylene group, R<sup>1</sup> is halogen, cyano or an optionally halogenated alkyl or alkoxy group with 1 to 12 C atoms, and L<sup>1</sup> and L<sup>2</sup> are, independently, H, F, Cl, CN, or a halogenated alkyl, alkoxy, or alkanoyl group with 1 to 7 C atoms.

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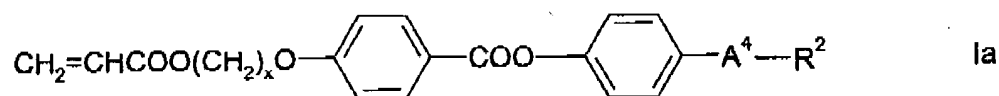
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23. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim ~~44~~ 36, wherein the polymerizable material comprises 1 to 80% by weight of at least one dielectrically positive monoreactive mesogenic compound.

24. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 23, wherein said dielectrically positive monoreactive mesogenic compound has a dielectric anisotropy  $\Delta\epsilon > 1.5$ .

25. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 23, wherein said dielectrically positive monoreactive mesogenic compound has a polar terminal group of CN, F, Cl, OCF<sub>3</sub>, OCF<sub>2</sub>H, OC<sub>2</sub>F<sub>5</sub>, CF<sub>3</sub>, OCN or SCN.

26. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim ~~44~~ 36, wherein the polymerizable material comprises at least one compound of the formula:



wherein x is 1 to 12, R<sup>2</sup> is C<sub>1-12</sub> alkyl or alkoxy, and

A<sup>4</sup> is 1,4-phenylene, trans-1, 4-cyclohexylene or a single bond;

at least one direactive compound of formula I; and at least one dielectrically positive monoreactive compound of formula I.

27. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim ~~44~~ 36, wherein the polymerizable mesogenic material is a mixture of:

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a1) 10 to 99% by weight of at least one mesogen according to formula I having one polymerizable functional group,

a2) 0 to 70% by weight of at least one mesogen according to formula I having two or more polymerizable functional groups, and

b) 0.01 to 5% by weight of an initiator.

28. (Previously Presented) Polymer layers according to claim 14, wherein the polymerizable mesogenic material is a mixture of:

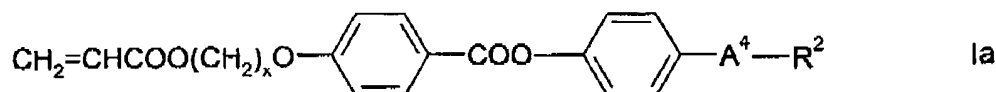
a1A) 10 to 65%, by weight of at least one compound of formula I having one polymerizable group, wherein R is an alkyl or alkoxy group with 1 to 12 C atoms;

a1B) 5 to 40% by weight of at least one compound of formula I having one polymerizable group, wherein R is CN, F, Cl or a halogenated alkyl or alkoxy group with 1 to 12 C atoms;

a2) 2 to 90% by weight of at least one compound of formula I having two polymerizable groups, wherein R has one of the meanings of P-(Sp-X)<sub>n</sub>; and

b) 0.01 to 5 % by weight of an initiator.

29. (Previously Presented) Polymer layers according to claim 28, wherein 10-65%, by weight of at least one compound of formula I is of the formula:



wherein x is 1 to 12, R<sup>2</sup> is C<sub>1-12</sub> alkyl or alkoxy, and

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A<sup>4</sup> is 1,4-phenylene, trans-1, 4-cyclohexylene or a single bond.

30. (Currently Amended) A liquid crystal display comprising a display cell and at least one polymer layer ~~polymer layers~~ according to claim 14 36.

31. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 14 36, wherein the mesogenic or mesogenicity supporting group is a compound of formula:



wherein

A<sup>1</sup>, A<sup>2</sup> and A<sup>3</sup> are, independently, 1,4-phenylene where one or more CH groups optionally replaced by N, 1,4-cyclohexylene, optionally, one or two non-adjacent CH<sub>2</sub> groups are replaced by O and/or S, 1,4-cyclohexenylene or naphthalene-2, 6-diyl, optionally these groups are unsubstituted, mono- or polysubstituted with a halogen, a cyano, or a nitro group, or an alkyl, alkoxy or alkanoyl group having 1 to 7 C atoms, wherein one or more H atoms may be substituted by F or Cl,

Z<sup>1</sup> and Z<sup>2</sup> are each, independently, -COO-, -OCO-, -CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -CH<sub>2</sub>O-, -CH=CH-, -C≡C-, -CH=CH-COO-, -OCO-CH=CH- or a single bond and

m is 0, 1 or 2.

32. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 14 36, wherein n=1.

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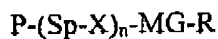
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33. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 44 36, wherein the tilt angle  $\theta$  is 5-80° and the polymerizable mesogenic material comprises at least 96% by weight of polymerizable compounds.

34. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim 44 36, wherein the at least 95% by weight of polymerizable compounds are of the formula I.

35. (Previously Presented) An anisotropic polymer layer exhibiting a tilted structure with an optical axis having a tilt angle  $\theta$  relative to the plane of the layer greater than zero, obtained by polymerizing a polymerizable mesogenic material comprising at least one compound of the formula:



I

wherein

P is a polymerizable group,

Sp is a spacer group having 1 to 20 C atoms,

X is a group of -O-, -S-, -CO-, -COO-, -OCO-, -OCOO- or a single bond,

n is 0 or 1,

MG is a mesogenic or mesogenicity supporting group,

and

R is an alkyl radical with up to 25 C atoms optionally unsubstituted, mono- or polysubstituted by halogen or CN, optionally one or more non-adjacent CH<sub>2</sub> groups are replaced, independently, by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-,

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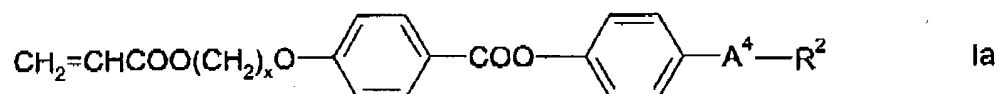
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-CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S- or -C≡C- where oxygen atoms are not linked directly to one another, or R is halogen, cyano or, independently, P-(Sp-X)<sub>n</sub>- as defined in formula I;

wherein the polymerizable mesogenic material comprises at least 95% by weight of polymerizable compounds and wherein the polymerizable mesogenic material is a mixture of:

a1A) 10 to 65%, by weight of at least one compound of formula I is of the formula:



wherein x is 1 to 12, R<sup>2</sup> is C<sub>1-12</sub> alkyl or alkoxy, and

A<sup>4</sup> is 1,4-phenylene, trans-1, 4-cyclohexylene or a single bond;

a1B) 5 to 40% by weight of at least one compound of formula I having one polymerizable group, wherein R is CN, F, Cl or a halogenated alkyl or alkoxy group with 1 to 12 C atoms;

a2) 2 to 90% by weight of at least one compound of formula I having two polymerizable groups, wherein R has one of the meanings of P-(Sp-X)<sub>n</sub>; and

b) 0.01 to 5 % by weight of an initiator.

36. (Currently Amended) An anisotropic polymer layer exhibiting a tilted structure with an optical axis having a tilt angle  $\theta$  relative to the plane of the layer greater

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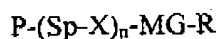
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than zero, obtained by polymerizing a polymerizable mesogenic material comprising at least one compound of the formula:



I

wherein

P is a polymerizable group,

Sp is a spacer group having 1 to 20 C atoms,

X is a group of -O-, -S-, -CO-, -COO-, -OCO-, -OCOO- or a single bond,

n is 0 or 1,

MG is a mesogenic or mesogenicity supporting group, and

R is an alkyl radical with up to 25 C atoms optionally unsubstituted, mono- or polysubstituted by halogen or CN, optionally one or more non-adjacent CH<sub>2</sub> groups are replaced, independently, by -O-, -S-, -NH-, -N(CH<sub>3</sub>)-, -CO-, -COO-, -OCO-, -OCO-O-, -S-CO-, -CO-S- or -C≡C- where oxygen atoms are not linked directly to one another, or R is halogen, cyano or, independently, P-(Sp-X)<sub>n</sub>- as defined in formula I;

wherein the polymerizable mesogenic material comprises at least 95% by weight of polymerizable compounds, and

the tilt angle  $\theta$  in said layer varies continuously in a direction normal to the layer, starting from a minimum value  $\theta_{min}$  of 0 – 20 degrees at one side of the layer and ranging to a maximum value  $\theta_{max}$  of 20 – 90 degrees on the opposite side of the layer.

37. (Currently Amended) A polymer layer ~~Polymer layers~~ according to claim ~~44~~ 36, wherein the polymer ~~layers are~~ layer is untwisted.

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